ENVIRONMENTAL IMPACT STATEMENT REVIEW

Tennessee Valley Authority

Review of Final Environmental Statement

Watts Bar Nuclear Plant

Units 1 & 2

August 1993

ENVIRONMENTAL
IMPACT STATEMENT
REVIEW

ENVIRONMENTAL IMPACT STATEMENT (EIS) REVIEW

Watts Bar Nuclear Plant

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Introduction

TVA's Watts Bar Nuclear Plant (WBN) is a two-unit, 2,540 MW plant located near Spring City, Tennessee, approximately 50 miles northeast of Chattanooga, Tennessee. The Atomic Energy Commission (AEC) issued construction permits for both of the units in January 1973 (AEC licensing activities are now the responsibility of the Nuclear Regulatory Commission (NRC)). Construction of the plant commenced in 1973. Although construction of WBN Unit 1 was substantially complete in 1985, efforts to obtain an operating license were delayed in order to resolve safety concerns. Modifications to address these concerns and to ensure compliance with current licensing requirements have been or are being completed.

Current load forecasts now project that Units 1 and 2 will be needed in 1994 and 1999, respectively. Consistent with 40 C.F.R. §1502.9(c), TVA has reviewed WBN's environmental impact statement (EIS) to confirm that it should not be supplemented at this time. This report summarizes the review.

Watts Bar EIS

TVA released the WBN Draft EIS for public review and comment in May 1971 and the Final EIS in November 1972. The EIS is a one-volume document that comprehensively reviews the potential environmental and socioeconomic impacts of constructing and operating the plant. In addition, TVA updated the WBN EIS on November 18, 1976, with the Environmental Information statement that was submitted to NRC and responded to NRC's questions with Environmental Information Supplement 1 in 1977. NRC issued its Final Environmental Statement, NUREG-0498 in December 1978. Based on a review of these documents and information about

existing environmental conditions, TVA has determined that neither the plant design nor environmental conditions have changed in a manner that materially alters the environmental impact analysis set forth in the EIS.

The EIS concluded that the principal ways the plant will interact with the environment are: (1) releases of small quantities of radioactivity to air and water, (2) release of minor quantities of heat and non-radioactive waste waters to TVA's Chickamauga Reservoir and major quantities of heat and water vapor from the plant's cooling towers into the atmosphere, (3) loss of aquatic life (such as fish larvae and plankton) that is drawn into the water intake, and (4) a change in land use from farming to industrial. These conclusions remain valid today.

Section 3 of the EIS summarizes in greater detail the potential adverse environmental effects of the plant that were deemed unavoidable. These effects are still expected to result from completion of construction and operation of the plant.

Review Summary

Based on knowledge of the plant design, NRC and environmental regulatory requirements, and conditions within the vicinity of the plant, ten sections of the EIS were identified that address the potential impacts of plant activities that have changed or are likely to change compared to the EIS. These sections are:

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Changes may have occurred or will occur that could affect other EIS sections, but such changes are not expected to have a material effect on the environment or the EIS analysis, especially when compared to the identified sections.

New and Spent Fuel Shipments

The EIS projected that approximately 100 tons of nuclear fuel would be shipped annually to the plant. Current estimates indicate that no more than that amount would be shipped to the plant each year. The EIS notes that all shipments would be made in accordance with AEC (now NRC) and Department of Transportation requirements which were designed to protect the public from radiation exposure. Similar regulatory safeguards are in effect today, and TVA will comply with them when making shipments.

The EIS concluded that the health and environmental impacts associated with new fuel shipments would likely be very minimal. Normal shipments would expose individuals living along the transportation route to an insignificant fraction of the exposure from natural background radiation.

It was determined that new fuel transportation accidents would not result in radiation releases above those associated with normal shipments. These determinations remain valid. Similarly, it was determined that normal shipments of spent fuel would expose members of the public to radiation levels that are a very small fraction of normal background radiation levels. Although accidents occurring during the transportation of spent fuel would likely expose members of the public to higher radiation doses than normal shipments, the EIS concluded that whole-body exposures would still be negligible and that the probability of being exposed to significant doses was extremely small. Although population densities are higher, the dose methodologies and estimates used in the EIS remain valid.

The EIS contemplated that reprocessing of spent fuel would likely occur, and estimates were projected based on shipments of spent fuel to a spent fuel reprocessing plant in Barnwell, South Carolina. Reprocessing is now not likely under current national energy policy. TVA now expects to store spent fuel on-site until the U.S. Department of Energy (DOE) completes the construction of storage or permanent disposal facilities in accordance with the Nuclear Waste Policy Act of 1982. If necessary, TVA will provide additional storage capacity on site, until DOE accepts the spent fuel, by using one or more of the following technologies: high density spent fuel storage racks, fuel rod consolidation, or dry storage outside the reactor building. Prior to selecting one of these alternatives, if it becomes necessary, TVA will conduct an appropriate environmental review. Numerous examples of safe, environmentally acceptable storage capacity increases have already been implemented at domestic nuclear utility sites.

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DOE has proposed to locate the permanent disposal facility in Nevada. Shipments of spent fuel to Nevada could expose more people to radioactive releases because of the increase in shipment mileage, but the resulting doses would not be greater than those projected in the EIS on an individual basis.

Section 2.1.1 of the EIS stated that TVA would apply for a special nuclear license to receive, possess, and store fuel elements. TVA has now received such a license.

Radioactive Waste Shipments:

The EIS estimated that TVA would ship packaged radioactive waste totaling about 8,434 cubic feet (1,750 cubic feet of process waste and 6,684 cubic feet of tritiated water) annually from WBN. Based on the operating experience at TVA's Sequoyah Nuclear Plant (SQN), the volume of radwaste eventually shipped to licensed disposal sites is now expected to be smaller (approximately 4,000 cubic feet annually) and the number of waste shipments will likely be less than those projected in the EIS. The EIS committed TVA to disposing of radwaste only at licensed disposal facilities; this commitment remains unchanged. The EIS assumed that a disposal facility in Morehead, Kentucky, would be used, but this facility is now closed. A new facility to be located in either Wake/Chatham County or Richmond County, North Carolina, would likely now be used but projected impacts would be similar or somewhat less.

Transmission Lines:

The EIS indicated that transmission lines into and out of WBN would be built in two phases. All of these lines are complete and have been energized. Since release of the EIS, concerns have been voiced about possible health effects (e.g., cancer) associated with exposure to electric and magnetic fields (EMF).

TVA recognizes that these concerns about EMF exist. Research is continuing that is devoted to determining if there are effects and what impact any effects may have on health. TVA is aware of and ensures that it stays aware of the published research and study results; TVA directly supports some of the research and study efforts. Research quality has improved drastically in recent years, but available results continue to be contradictory from study to study. Exactly opposite results are being obtained from the largest and best efforts available when the same health effect end point is examined, using the same methods. Therefore, science still does not support any cause and effect conclusions between EMF and adverse health effects.

Of the several studies completed to date, a few have been interpreted as suggesting a weak statistical association between magnetic fields and some forms of rare cancer. The conflicting results of the studies do not support a causal relationship between such fields and human cancer, nor is there a pattern suggesting a relationship to other long-term health effects.

Radioactive Discharges:

Consistent with regulatory requirements, TVA's policy is to manage radioactive releases from its nuclear power plants at levels as low as reasonably achievable (ALARA). This is also the policy stated in the WBN EIS. TVA intends to achieve this by employing the available state-of-the-art waste treatment systems and other passive methods. The EIS contemplated that treatment systems identified in the EIS would be modified or supplemented to take advantage of technological improvements and evolving regulatory requirements.

Consistent with this expectation, design of these systems has changed to reflect TVA's and the nuclear industry's operating experiences. Based on operational data from the systems employed at SQN, TVA expects that the modified treatment systems at WBN would result in radioactive releases and resulting doses of about the same magnitude as those projected in the EIS. Among the releases which could occur is the discharge of slightly radioactive liquid effluent from the Turbine Building Sump to the Yard Holding Pond via the Low Volume Waste Treatment or Metal Cleaning Ponds. All other releases of radioactive liquids would be discontinued when the main plant discharge (Cooling Tower Blowdown) is routed to the Yard Holding Pond (during time of insufficient riverflow) but the Turbine Building Sump would always be released to one of the intermediate ponds. Normally this discharge will contain no radioactivity, but could become slightly contaminated during the unlikely event of primary to secondary leakage. Based on operating experience at Sequoyah, which operates in a similar manner, the levels of activity in this discharge would be low. Sampling of the pond sediment would be conducted to monitor for radioactivity. Most of the radioactivity released to this pond through this pathway, if any, won't be tritium, which would not deposit in the sediment, but be released to the river when the contents of the holding pond are released. Both the EIS projections and actual data from SQN indicate that resulting doses at WBN will be less than 1 percent of the NRC guidelines.

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TVA committed to a comprehensive radiological monitoring program in the EIS. Although actual sample and monitoring locations may vary from those assumed for the EIS analysis, TVA intends to conduct a radiological monitoring program that is as comprehensive as that described in the EIS; however, newer kinds of monitoring and analytical equipment would of course be used. Results of this monitoring program will be submitted to NRC in accordance with the approved technical specifications.

Non-radioactive Discharges

Potential non-radioactive discharges from WBN in the form of air and water pollution and solid waste are extensively controlled by Federal and State statutes and regulations. The goal of these legal authorities is protection of human health and the environment. The plant has been issued air permits and National Pollutant Discharge Elimination System (NPDES) water permits which have been maintained and renewed during the construction phase of the plant. The air permits are reviewed routinely, and the NPDES permit is renewed on a five-year cycle. Application to renew the plant's NPDES permit was made in April 1989; TVA must comply with it's existing permit until the state acts on this application. Prior to the last renewal, a detailed walkdown of the plant was conducted to ensure previously identified discharge point sources remained valid. In addition to the walkdown, a comprehensive sampling and analytical study was performed for the purpose of verifying data associated with the discharge point sources. It was determined that plant discharges and potential discharge pathways conformed to the NPDES permit.

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Changes have occurred in potential plant discharges and more are likely to occur, but compliance with applicable regulatory safeguards and internal assessments will ensure that resulting effects are insignificant. The current status of major discharge pathways or treatment/control strategies is summarized below.

Chemical discharges:
The potential sources of chemicals and chemical quantities were reviewed and updated in connection with renewal of the NPDES permit. The computations and assumptions used for this review were consistent with those in the EIS and potential impacts are still expected to be insignificant. This is confirmed by routine toxicant testing. See "Biological Impacts" and "Endangered and Threatened Species" sections.

Cooling tower blowdown/drift and heat dissipation:
The EIS analysis and assumptions for cooling tower blowdown and heat dissipation continue to be valid and are adequate to meet NPDES effluent limits. If later analysis indicates that water quality criteria are likely to be exceeded, appropriate treatment technology will be applied to meet the applicable NPDES permits.

Cooling tower makeup water and raw cooling water systems:

Chlorine and bromine are the preferred additive for the control of fauna, flora, and clams in WBN's circulating and cooling water systems. Acrolein, an unsaturated aldehyde, will not be introduced in the plant's water systems as assumed in the EIS because of recent advancements in cooling water chemicals and treatment. It is anticipated that chemical biocides will also be used to control zebra mussels that have recently been found in TVA's reservoir system.

Water filtration, demineralization, and condensate polishing:

Water processing, including clarification, demineralization, and condensate polishing (including waste neutralization), continues to be feasible for steam system water makeup requirements at WBN. The basic engineering theory and processes employed in the nuclear industry today for processing and treatment of raw water closely parallel the methods addressed in the EIS. The plant does currently purchase demineralized water and will probably continue to do so in the future. This is typical for the industry today and does not have important environmental ramifications.

Component cooling water system:

The EIS description of the component cooling water system, which is used to cool components of the primary reactor system, reflects the current design and is consistent with today's treatment theory.

One change that has occurred since release of the EIS is that advancements in corrosion inhibition have all but eliminated the use of ammonia, morpholine, cyclohexylamine, or hydrazine as primary corrosion inhibition agents. Tolytriazole and molybdate, which are widely used throughout the nuclear industry today, will likely be used for pH and corrosion control. This use is allowed by the NPDES permit and any environmental effects should be insignificant.

Reactor coolant system:
It is still likely that boric acid, lithium hydroxide, and hydrazine will be used during plant operation and startup as identified in the EIS. These chemicals are used in most pressurized water reactors today and are allowed under the plant's NPDES permit.

Auxiliary steam generator system blowdown:
Current plant design still calls for the use of two 40,000 pound per hour oil-fired boilers to supply building heat and steam for unit startup. As addressed in the EIS, hydrazine and ammonia will likely be used for oxygen scavenging and corrosion inhibition, respectively, in these boilers. Impacts from this are expected to be insignificant.

Chemical/miscellaneous cleaning during construction:
Plant components may be chemically cleaned prior to initial startup as addressed in the EIS. A combination of monosodium, disodium, or trisodium phosphate and a wetting agent would be used for this.

Phosphate waste waters generated during cleaning would be discharged to on-site holding ponds to be treated; subsequent pond discharges will comply with NPDES limits.

Yard drainage system:
Plant grounds drain into a yard drainage pond as described in the EIS. This pond serves as an intermediate or interception collection point and is equipped with skimming capability to facilitate removal of floating debris and oil. A similar design is currently used at SQN. WBN has deleted the control room water level alarm for the yard holding pond. The yard holding pond level will be controlled by administrative procedures similar to SQN. This change does not affect discharging of the yard holding pond.

Transformers and electrical machinery:
Consistent with applicable regulations, TVA has prepared a Spill Prevention Control and Countermeasures (SPCC) plan which addresses potential spills into waters of the United States from equipment or machinery at the plant. Such spills could include diesel fuel oil, gasoline, insulating oil, lube oil, and other lubricating oils. This is consistent with the EIS. The EIS contemplated that PCB transformers would be used at the plant; however, all such equipment is being removed from the site or retrofilled with mineral oil. Transformers that still contain PCBs are indoors and located in secondary containment. This minimizes the potential risk of PCB spills.

Sanitary wastes:
In accordance with applicable regulatory requirements, the sewage systems will be operated to prevent untreated effluents from entering the river. NPDES permit conditions address such discharges and are consistent with the EIS; potential impacts are expected to be insignificant.

Air emissions:
The two oil-fired boilers used for building heat and startup steam will emit small amounts of air pollutants as addressed in the EIS. These emissions will be controlled as necessary to meet applicable regulatory requirements, and resulting impacts are expected to be insignificant.

Solid waste:
Non-radioactive and non-hazardous solid waste including construction debris, office waste, and any asbestos waste that may be generated at the plant would be disposed of either in State-approved sanitary landfills or in on-site approved landfills depending on the waste and economics. Any resulting impacts should be insignificant in light of the kinds of waste and the disposal requirements which must be met. Any hazardous waste, such as used chemicals, would be disposed of or treated off-site at State- or EPA-approved treatment/disposal facilities. Solid and hazardous waste regulatory requirements have generally become more stringent since release of the EIS.

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Biological Impact and Terrestrial and Amphibious Vertebrate Survey and Vegetation Survey and Analysis

Aquatic Ecology:

Consistent with the EIS commitment to conduct comprehensive environmental monitoring, preoperational aquatic monitoring was conducted at WBN from 1973 - 1979. The results of most of this initial monitoring effort were summarized in the 1976 Environmental Information Statement and in the December 1978 NRC Environmental Statement. By 1982, it was clear that the operational date of WBN would be substantially delayed, so TVA initiated a program to update the WBN preoperational data base. That program continued until 1986, when it was decided that a sufficient amount of that type of broad baseline ecosystem information had been obtained. In 1986, a comprehensive report was issued entitled "Preoperational Assessment of Water Quality and Biological Resources of Chickamauga Reservoir, Watts Bar Nuclear Plant, 1973-1985." A summary of the WBN Preoperational Aquatic Monitoring Programs is provided in Table 1, on page 19 of this report.

Beginning in 1986, the emphasis was shifted from baseline ecosystem studies to studies directed at specific issues which were identified in concert with Tennessee regulatory and resource management agencies. These studies generally focused on Chickamauga Reservoir aquatic resources and the potential effect of two nuclear plants (WBN and Sequoyah) operating on the same reservoir. The studies included in this special aquatic monitoring program are summarized in Table 2, on page 20 of this report.

The results of all of the baseline and special aquatic monitoring studies from 1972 to the present were reviewed for this document. The studies generally support and reinforce the conclusions of the EIS with regard to potential aquatic biological impacts. The EIS identified certain aspects of plant operation as having potential for impacts on aquatic communities. The following summarizes those potential impacts in the context of presently available information.

Entrainment of phytoplankton and zooplankton in the intake cooling water:

Little has changed to alter the conclusion that this will not result in irretrievable losses to the aquatic ecosystem in the vicinity of WBN. Studies to date indicate that virtually all plankton that passes WBN originates in Watts Bar Reservoir and passes through the turbines at Watts Bar Hydro. There is no reason to suspect that the plankton is not uniformly distributed so that entrainment losses will be proportionately equal to hydraulic entrainment, which will be a maximum of 0.7% of average summer flow past the plant.

Preoperational monitoring has shown that plankton populations at the plant vary enormously from day to day (even from hour to hour), so the loss of less than 1% of the plankton population would not be statistically detectable and would be insignificant to the ecosystem. Extensive plankton entrainment studies at SQN, which at times entrains up to 30% of the flow past the plant, have detected measurable effects on the population only during periods of low flows coupled with maximum plant operation. Even then recovery occurs a short distance below the discharge, and no ecosystem effects are demonstrable.

Entrainment of larval fish in the intake cooling water:
The entrainment and destruction of larval fish will occur in essentially the same proportion as other planktonic organisms. When the EIS was issued, the significance of the tailwater reach between WBN and the dam as a spawning area for migratory spawners such as sauger and white bass was unknown. Targeted studies have since confirmed that the primary spawning site for sauger in Chickamauga Reservoir is at Hunter Shoals located at TRM 520-522 some 6 to 7 miles below the WBN site. Hunter Shoals is also a major white bass spawning area. There is no major spawning activity by either species in the tailwater reach from Watts Bar Dam to Hunter Shoals. Based on this information, the conclusion that entrainment of fish larvae will not result in a significant impact is reinforced.

Impingement of juvenile and adult fish on the cooling water intake screens:
Nothing has changed that will alter the conclusion that fish impingement will be insignificant due to the low intake velocity and relatively small makeup water volume required by the closed cycle cooling system.

Thermal effects due to discharge of heated cooling tower blowdown water from multiport jet diffusers:
The thermal characteristics of the discharge have not changed.

Any thermal effects should be limited to the discharge mixing zone, which extends less than 100 meters downstream from the diffusers and influences less than 40% of the cross-sectional area of the river at normal summer elevations.

The original analysis of a worst-case scenario that would result in the maximum allowable temperature of 30.5°C to be exceeded at the edge of the mixing zone included the heat release from Watts Bar Fossil Plant in the calculation. Future operation of the fossil plant and the mode of operation is uncertain since the plant was placed in cold standby condition in the early 1980s. Thus, the risk that upstream temperatures could approach or exceed the maximum allowable temperature is lessened compared to the EIS.

Effects of plant discharges on mussel communities: Various sections of the EIS include information about freshwater mussels in the adjacent reach of the Tennessee River; however, much of that information is now out of date.

Since 1972, TVA aquatic biologists and others have conducted a great deal of mussel field work in the Tennessee River downstream from Watts Bar Dam, much of which has been done as part of preoperational monitoring for WBN. Also during this period, the mussel sanctuary in the area has been extended nearly seven miles downstream (to River Mile 520.0) by the Tennessee Wildlife Resources Agency.

Native mussel resources are now known to occur in various concentrations throughout the Watts Bar tailwater. One "mussel bed" exists along the right (descending) shoreline between River Miles 526 and 527, just downstream from the mouth of Yellow Creek and the WBN discharges. In order to ensure that plant operations have minimum adverse effects on mussel populations, as concluded in the EIS, TVA will monitor these mussel beds to identify any adverse effects and, as necessary, will reduce any unacceptable effects.

Buildup of existing heavy metal concentrations in the blowdown water due to evaporative losses with subsequent direct or indirect effects on aquatic life:
The EIS stated that no heavy metals would be added to the plant discharge and that concentration of metals already existing in the raw intake water would be the only factor involved. However, zinc sulfate is now being added to control corrosion of carbon steel. TVA has committed to the State to conduct monthly toxicity testing to confirm that the discharge of zinc and other corrosion inhibitors do not result in toxic effects. If toxic effects are observed, preventative measures, such as altering the plant's corrosion control methods, would be employed.

Use of molluscicides to control clams:
The non-oxidizing molluscicide Clam-Trol (CT-1) is being used at WBN for control of Asiatic clams and would likely be used in the future to control zebra mussels.

The toxicity testing to which TVA has committed will be expanded to include juvenile mussels in order to identify any adverse effects which may result from use of this molluscicide although TVA does not anticipate significant effects due to the amounts used, frequency of use, and the dilution effect of the receiving waters. If unexpected adverse effects are observed, a different clam control method would be employed.

The threat posed by zebra mussels and possible means of controlling these and other biofouling mollusks are addressed in a TVA- U.S. Corps of Engineers Environmental Assessment, "Control of Attached Biofouling Mollusks (Zebra Mussels and Related Species) At Facilities Operated By USCAE-Nashville District and Tennessee Valley Authority". Use of chemical biocides is controlled by the NPDES permit and potential impacts should be insignificant. However, to confirm this, TVA will further evaluate the potential effects of any measure proposed for zebra mussel control and will coordinate this with the State and the U.S. Fish and Wildlife Service.

TABLE 1

Summary of WBN Baseline Preoperational Aquatic Monitoring Programs - 1972-1993

PROJECT	TYPE OF SAMPLING	YEARS CONDUCTED
Adult Fish	Population Inventory using fish toxicant (rotenone)	1970-1993
	Fish (Electrofishing, Gill-netting, Hoop-netting)	76-79, 82-86
Larval Fish	Trawling	76-79, 82-86
WBN Benthic	Bottom-dwelling organisms	73-77, 82-86
WBN Zooplankton	Planktonic animal life	73-77 82-86
WBN Phytoplankton	Planktonic plant life (algae)	73-77, 82-86
WBN Periphyton	Attached algae	73-77, 82-86
WBN Chlorophyll	Phytoplankton biomass	73-77, 82-86
WBN Primary Productivity	Phytoplankton photosynthesis	73-77, 82-86
WBN Autotrophic Index (AI)	Indicator of organic pollution	73-77, 82-86

TABLE 2

Summary of WBN/SQN Chickamauga Special Aquatic Monitoring Program - Issues - Directed Studies Project Type of Sampling Years Conducted

WBN Mussel Survey	Diver conducted population survey (biennial)	1983-1992
Sauger Population Study	Electrofishing, Gillnetting	1986-1991
	Larval sampling	1987
White Crappie Invest.	Larval netting, Light Traps	1986-1989
	Electrofishing, Trapnetting	1987-1989
White Bass Population Stdy.	Electrofishing,Tagging,	1990-1992
	Larval Sampling	1990-1991
Channel Catfish Study	Review of available data	1990-1992
Dissolved Oxygen Study	Reservoir-wide O_2 Dynamics	1987-1989

Endangered and Threatened Species:

Following the enactment of the Endangered Species Act in 1973, several Tennessee River freshwater mussels, a few large-river fish, and several primarily terrestrial species have been listed by the U.S. Fish and Wildlife Service as endangered or threatened (E&T). Information collected since 1972 (and since the 1976 Environmental Information Statement) indicates that one threatened fish (snail darter, Percina tanasi), and four endangered freshwater mussels (fanshell, Cyprogenia stegaria; dromedary pearly mussel, Dromus dromas; pink mucket, Lampsilis orbiculata; and rough pigtoe, Pleurobema plenum) occur in the first ten miles of the Tennessee River downstream from Watts Bar Dam. Two endangered terrestrial animals (bald eagle, Haliaeetus leucocephalus; and gray bat, Myotis grisescens) also occur in the vicinity of Watts Bar Nuclear Plant.

The core of the snail darter population exists in Sewee Creek, but young snail darters routinely drift down into the river during their first year of life. Most of the endangered mussels persist only in the Hunter Shoals area (River Miles 520-522); however, specimens of the pink mucket continue to be found throughout this river reach upstream to the dam, including along the river shoreline less than a mile downstream from the WBN discharge.

Bald eagles are uncommon to fairly common winter residents and rare summer residents in the WBN area. They forage primarily on fish and roost on wooded hillsides adjacent to the reservoir. Their regional population has greatly increased in the last two decades and, although none presently nest on Watts Bar or Chickamauga Reservoirs, nesting is possible in the future.

The nearest cave occupied by gray bats is about 4 miles downstream from WBN. Gray bats from this and other more distant caves likely forage on adult aquatic insects over the reservoir downstream from WBN.

Construction of the intake channel, discharge diffuser, and other in-water facilities, as well as land-based facilities such as transmission lines for the Watts Bar Nuclear Plant have been completed, and no additional construction related impacts on endangered or threatened species are anticipated. Operational impacts to the listed fish and mussel species could occur through the release of radioactive or non-radioactive discharges to the river as identified in the EIS. Such releases could also impact bald eagles and gray bats through effects on their prey base. Other sections of this review identify the procedures in place or proposed to be used to minimize environmental impacts from these discharges. These procedures are likely to provide similar protection for E&T species. However, E&T species living in or near the discharge mixing zone could be affected by levels of some plant effluents which could be allowed under typical NPDES permit limits, such as molluscicides which are used to control Asiatic clams or zebra mussels at WBN. TVA is aware of this potential impact and is working with the State to determine safe discharge concentrations of these chemicals.

In addition, as discussed in the Biological Impacts Section, TVA will conduct additional studies, including toxicity tests involving juvenile mussels, to confirm that operational discharge levels are not adversely impacting resident endangered species.

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Socioeconomic Impacts:

The EIS projected a permanent operating workforce of 170, and no significant impacts were projected. Current projections indicate that total onsite employment at commercial operation in September 1994 will be about 1800, but again, no significant impacts are expected. The basic reason is that the employees are already on site and many have been there for at least a year with no adverse impacts.

By 1994, they will have been totally integrated into the local communities. Some minor short-term economic impacts may occur as the construction employment (about 3,100 in December 1992) is phased out over a two-year period. However, the area's economy has experienced a number of similarly sized employment swings over the project's extended construction period without adverse impact.

Outline of Accident Analysis:

Severe Accidents:

The EIS evaluated the potential impacts of various accident scenarios, including "Class 9" accidents. Class 9 accidents were hypothesized sequences of successive failures of the plant's engineered safety features, resulting in severe accidents with attendant serious environmental impacts. However, the risk of such accidents was determined to be extremely low because of the conservative nature of the plant's engineered safeguards, quality assurance practices, and operating practices. NRC now requires licensees to consider the risk of severe accidents in more detail, including accident mitigation design alternatives which are possible plant design modifications that are intended to lessen the severity of the impact of this kind of accident.

This is called a "Severe Accident Mitigation Design Alternative" (SAMDA) analysis. Consideration of the probability of severe accidents and SAMDA occurs in the context of an "Individual Plant Examination" (IPE), which is submitted to NRC for approval. The IPE for WBN has been completed and has been submitted to NRC in accordance with the requirements contained in Generic Letter 88-20. This regulatory process will continue to ensure that the risk of significant impacts for severe accidents will be extremely low.

Conclusion

Changes have occurred since the release of WBN's EIS in 1972. Most of these changes involve design modifications or changes in expected operational practices which improve safety or lessen potential environmental impacts. Additional information about environmental conditions in the vicinity of WBN has also been developed. None of the changes or new information materially affect impact projections in the EIS.

In light of this review, TVA has determined that the WBN EIS does not have to be supplemented at this time. However, TVA will continue to monitor the situation and if changes or new information occur that materially affect impact projections in the EIS, a supplement will be prepared.

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David W. Sorrelle

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Education:	B.S. Zoology, Chemistry
Experience:	24 years, Environmental Protection and Chemistry, TVA; VARA International, Sony Magnetic Products, Alabama Power Company

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Sydney W. Spencer

Position:	Program Manager
Education:	B.S. Electrical M.B.A .Engineering
Experience:	18 years, Nuclear Licensing and Power Plant Operations, TVA and Nuclear Industry

Neil M. Woomer

Position:	Manager, Biological Assessment
Education:	Ph.D., Limnology
Experience:	Aquatic Biological Research, and Assessment, 27 Years, including 13 Years Nuclear Plant Monitoring and Assessment